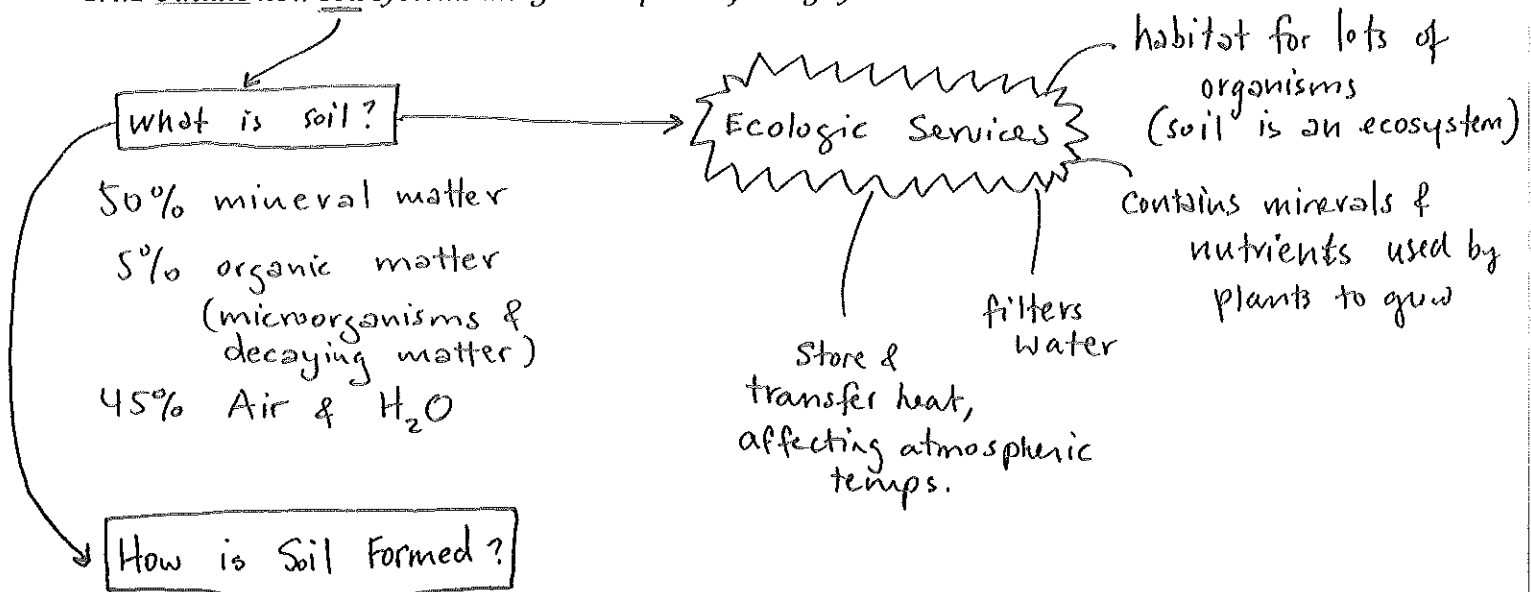


Soil

3.4.1 Outline how soil systems integrate aspects of living systems



- ① The Parent material (base geologic material) is exposed to the atmosphere.
- ② Weathering occurs & breaks down the rock
Types:
 - * Physical - wind, rain, temperature changes
 - * Chemical - water & other chemicals - cause chemical reactions
 - * Biological - living things break up rocks (ex. lichens in Primary Succession & tree roots)
- ③ Fine/smaller Particles are Formed
- ④ Erosion moves the Particles around.
- ⑤ Decomposition adds to soil → Deposition of organic "stuff" (leaves, dead organisms, etc.)

Players in Making Soil

* Rock Particles

Provides skeleton for soil.

* Most important feature

* Air

O₂ & N₂

Lots of air means O₂ for respiration & plant roots

* Humus

→ Plant & Animal matter decomposing

* Makes soil dark color, holds lots of H₂O, returns nutrients to soil.

* Soil Organisms

Soil invertebrates, microorganisms, & large animals.

→ Break down soil particles → Mix & aerate soil
→ recycle nutrients

* Water

Water moves in underground aquifers or goes down via precipitation.

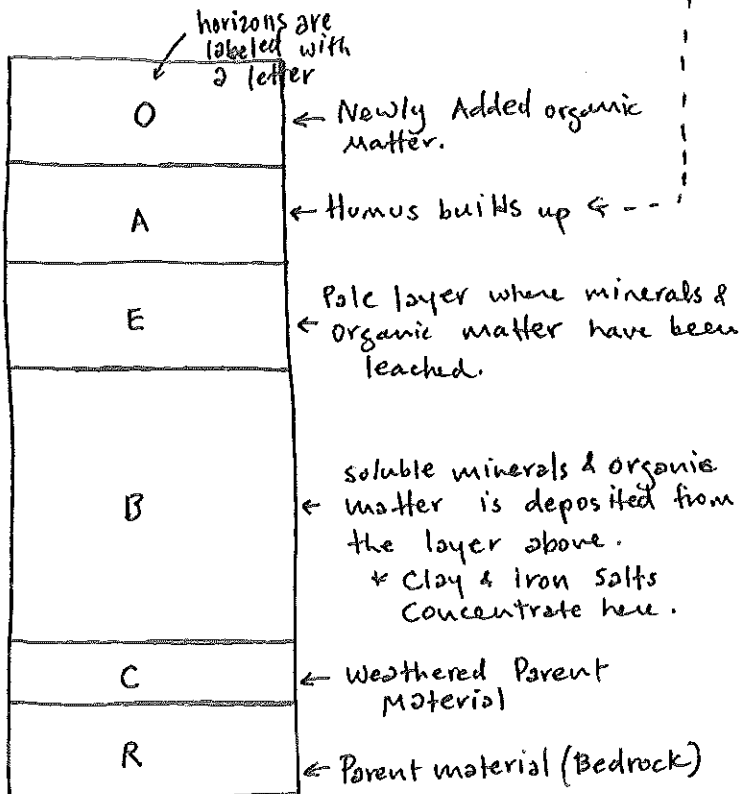
→ minerals that are dissolved in H₂O now available to plants, leaches minerals downward

3.4.2 Compare and contrast the structure and properties of sand, clay, and loam soils, including their effect on primary productivity

How is Soil Structured?

↓
in layers - each layer is a "horizon"

↓
all the layers of a soil are called a "soil profile"



Humus

After an organism dies & begins to be decomposed. Decomposition is incomplete.

- Very dark color
- holds LOTS of water
- Contains lots of Nutrients.

Soil Characteristics

* Color
darker means more organic matter → more nutrients

* Texture
Size of particles

- clay < 0.002 mm
- silt 0.002 - 0.05
- sand 0.05 - 2
- Loam - even mix of sand, silt, clay

Soil Porosity

Space bwt. particles

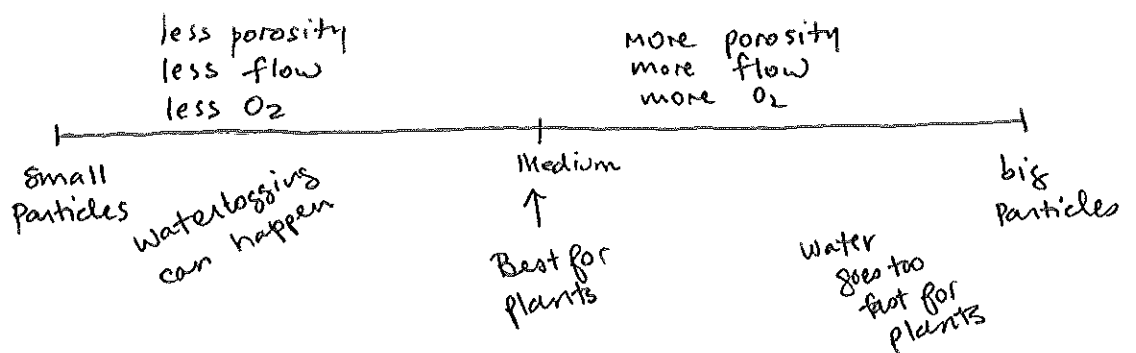
Soil Permeability

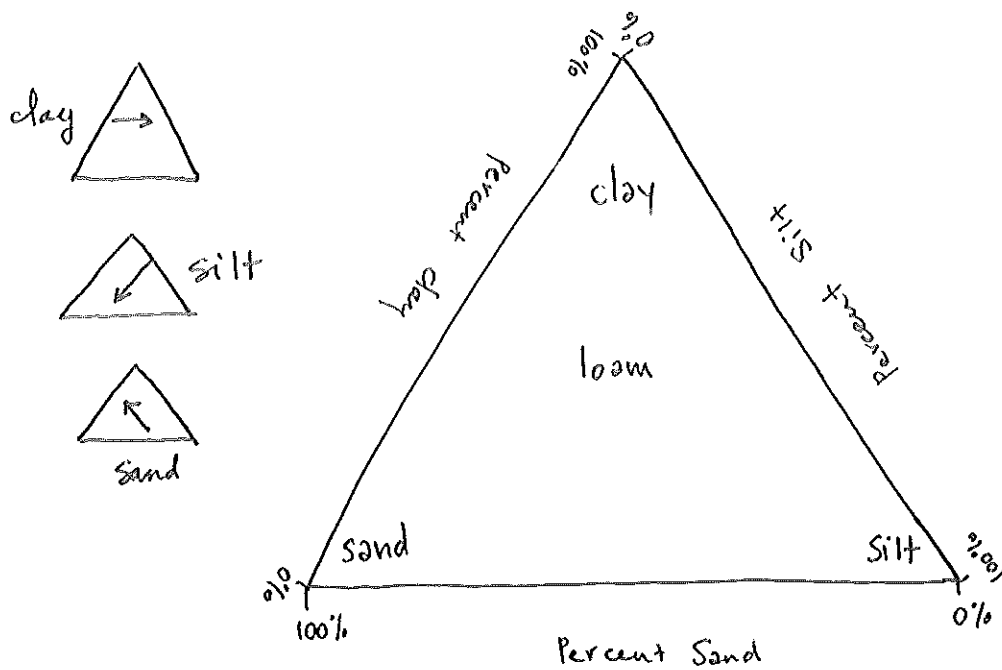
How fast H₂O is absorbed.

* pH

degree of acidity & alkalinity

↳ medium is good.





Compare 'em

Sandy Soil

Clay Soil

Loam Soil

Composition

sand
silt
clay

100%

15%
15%
70%

40%
20%
40%

Mineral
content

High

High

Med

Organic
Matter
Holding

Low

Low

Med

Drainage

Very Good

Poor

Good

Air Spaces

Large

Small

Med

Water-
Holding
Capacity

Low

Very High

Med

Plants &
Animals

Low

Low

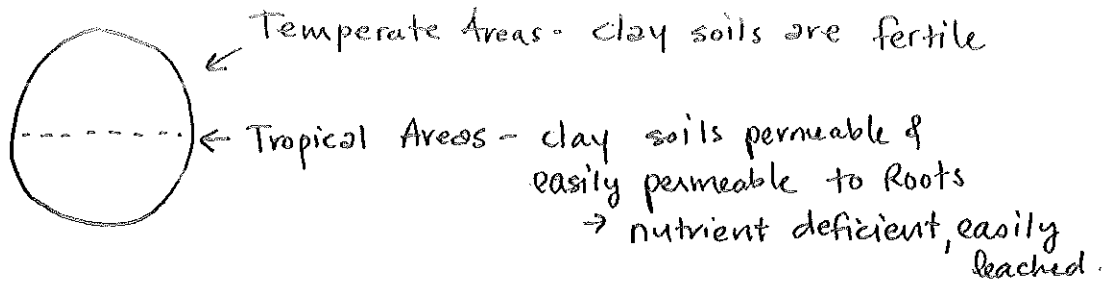
High

Primary
Productivity

Low

Very Low

High



⇒ Soil Fertility depends on location, not just type of soil

* Primary Productivity depends on:

- mineral content - plants need minerals to grow
- drainage → too fast → plants don't get enough
→ too slow → water logging → low O_2 → plants suffocate
- water-holding capacity → see drainage
- air spaces - plants need air to breathe
- biota
- potential to hold organic matter

Movement of Minerals

- if H_2O evaporates @ the top then capillary action pulls H_2O up. This carries minerals up.
- Irrigation - can cause this → leads to Salinization

Gleying

water can't drain away
anaerobic conditions

Nutrients

- especially Nitrogen, Phosphorus, & Potassium
↳ must be dissolved to be taken up by plants.

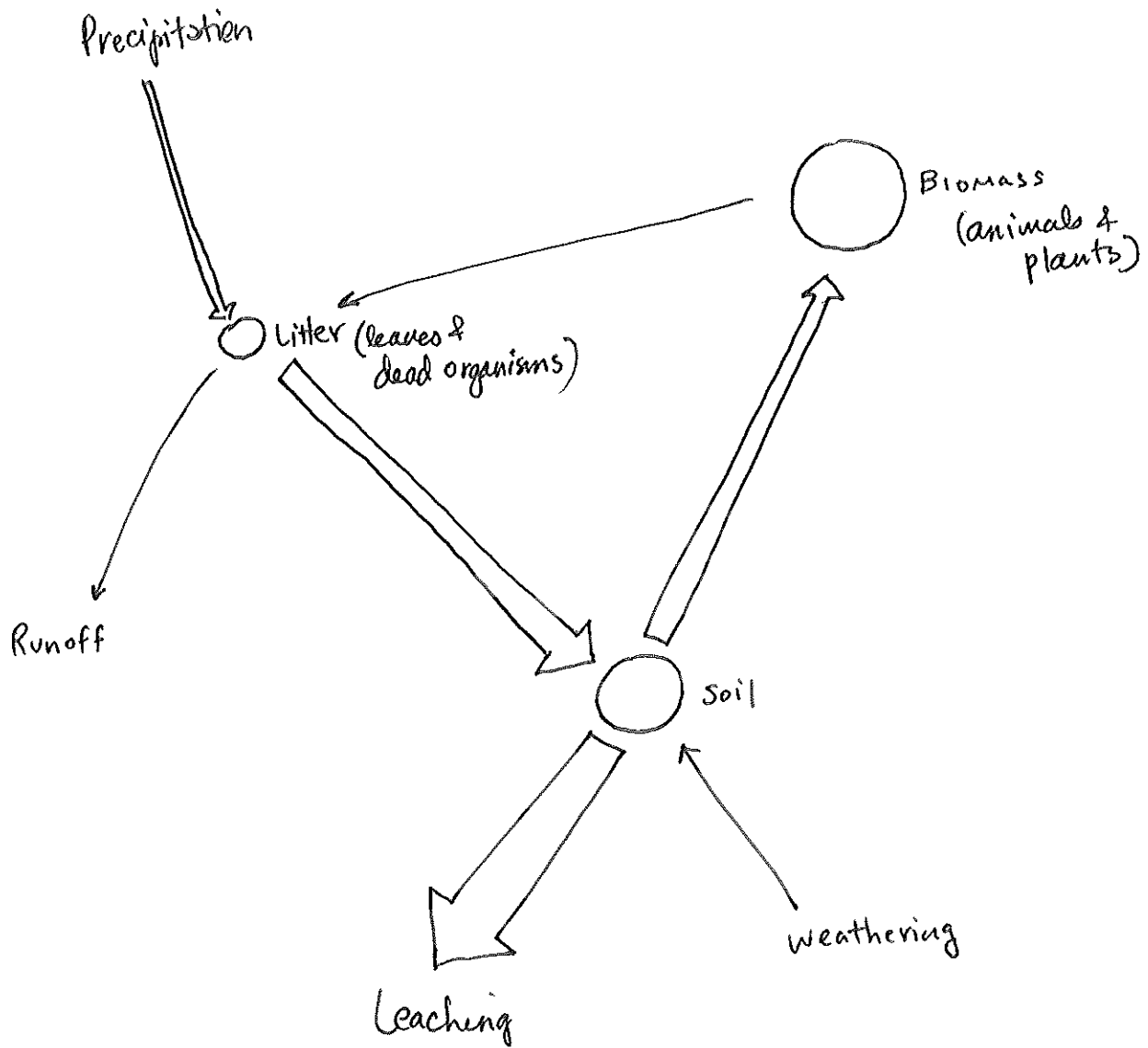
→ Can be either organic or inorganic

↑
made industrially & doesn't improve soil

↑
manure, Compost, etc.
* Add & improve Soil structure

Can lead to Eutrophication if they end up in waterways

Basic Nutrient Cycling



1.1.7 Describe transfer & transformation processes

1.1.8 Distinguish bwt. flows & storages

2.5.4 Describe & explain the transfer & transformation of materials as they cycle with an ecosystem.

Nitrogen
Cycle

